Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (previously presented) A method of improving color image data, comprising the steps of:

a) placing over a unit area a predetermined spatial pattern of color-component specific photo elements in a sensor, each of the color-component specific photo elements filtering a single predetermined color-component over one of sub-unit areas in the unit area, each of the color-component specific photo elements corresponding to a single pixel;

b) sampling color image data at the sensor;

c) generating chroma values for each of the color-component specific elements from the color image data;

d) simultaneously adjusting the chroma values with said step (c according to the specific spatial pattern of the color-component specific elements based upon coefficients that spatially correspond to a specific set of the color-component specific photo elements; and

e) estimating an intensity value for each of the pixels based upon the chroma values adjusted in said step d) and the color image data from said step b).

2. (original) The method of improving resolution in color image data according to claim 1 further comprising the steps of:

f) further adjusting the chroma values for an improved color characteristic between said step d) and said step e).

g) adjusting the intensity value for an improved edge characteristic after said step e); and

h) generating RGB data based upon the chroma values adjusted in said step f) and the intensity value adjusted in said step g).

3. (original) The method of improving color image data according to claim 2 further comprising an additional step i) of gamma converting the RGB data after said step h).

4. (currently amended) The method of improving color image data according to claim 1 wherein the color image data is in a RGB data format in said step ~~a~~b).

5. (currently amended) The method of improving color image data according to claim ~~1~~ 4 wherein said step ~~a~~b) uses a first predetermined matrix for converting the color image data to the RGB data format.

6. (original) The method of improving color image data according to claim 5 further comprising an additional step j) of gamma converting the RGB data.

7. (original) The method of improving color image data according to claim 5 wherein said step d) uses a second predetermined matrix for converting the RGB data to the chroma values.

8. (currently amended) The method of improving color image data according to claim 7 wherein said first matrix and said second matrix are combined into a third matrix to be applicable in an additional step for replacing ~~said step a),~~ said step ~~b~~c) and said step ~~c~~d).

9. (original) The method of improving color image data according to claim 1 wherein said step d) adjust the chroma values based upon a predetermined filter.

10. (original) The method of improving color image data according to claim 7 wherein the intensity in said step e) has a range equal to all of the color-component specific photo elements in the sensor.

11. (previously presented) The method of improving color image data according to claim 10 wherein the intensity in said step e) is determined based upon following equations:

$$Y = Y_0 CCD1 + Y_1 C_r + Y_2 C_b$$

$$Y_0 = -C_G / C$$

$$Y_1 = (R1\ C_G - G1\ C_R)/C$$

$$Y_2 = (B1\ C_G - G1\ C_R)/C$$

$$C = -G1 + G1\ C_R - R1\ C_G - B1\ C_G + G1\ C_B$$

where Y is intensity of one of the color-component specific elements; CCD1 is a color image data value from a predetermined photo sensor element; C_r and C_b are the chroma values; R1, G1 and B1 are a portion of the first matrix; C_R, C_B and C_G are predetermined constants.

12. (previously presented) A system for improving color image data, comprising:

a color image sensor having multiple sets of a predetermined spatial pattern of color-component specific photo elements for generating color image data, each of the color-component specific photo elements filtering a predetermined color-component over one of sub-unit areas in a unit area, said color image sensor sampling the color image data for the unit area using the color-component specific photo elements, each of the color-component specific photo elements corresponding to a single pixel;

an interpolated chroma value generator connected to said color image sensor for generating interpolated chroma values according to the spatial pattern and for simultaneously adjusting the chroma values based upon coefficients that spatially correspond to a specific set of the color-component specific photo elements; and

an intensity estimator connected to said interpolated chroma value generator and said color image sensor for estimating an intensity value for each of the pixels based upon the interpolated chroma values and the color image data.

13. (original) The system for improving color image data according to claim 12 wherein said interpolated chroma value generator further comprises a color-component specific spatial filter for interpolating the color image data and a convertor for converting the color image to the chroma values.

14. (original) The system for improving color image data according to claim 12 further comprising a smoothing filter connected between said interpolated chroma value generator and said intensity estimator for reducing an error amount in the color image data.

15. (original) The system for improving color image data according to claim 14 further comprising an edge enhancement filter connected to said intensity estimator for enhancing an edge.

16. (original) The system for improving color image data according to claim 15 further comprising a RGB converter connected to said smoothing filter and said edge enhancement filter for generating a set of RGB data.

17. (previously presented) The system for improving color image data according to claim 12 wherein said color image sensor is one dimensional.

18. (previously presented) The system for improving color image data according to claim 12 wherein said color image sensor is two-dimensional.

19. (previously presented) The system for improving color image data according to claim 18 wherein said color image sensor is at least three by three of said color-component specific photo elements.

20. (original) The system for improving color image data according to claim 14 wherein said smoothing filter is a median filter for outputting a median value.

21. (original) The system for improving color image data according to claim 14 wherein said smoothing filter is a low-pass filter for outputting a median value.

22. (original) The system for improving color image data according to claim 12 wherein said intensity estimator estimates the intensity value in a range equal to all of the color-component specific photo elements in said single-plane color image sensor.

23. (previously presented) The system for improving color image data according to claim 22 wherein said intensity estimator estimates the intensity value based upon following equations:

$$Y = Y_0\,CCD1 + Y_1\,C_r + Y_2\,C_b$$

$$Y_0 = -C_G / C$$

$$Y_1 = (R1\,C_G - G1\,C_R)/C$$

$$Y_2 = (B1\,C_G - G1\,C_R)/C$$

$$C = -G1 + G1\,C_R - R1\,C_G - B1\,C_G + G1\,C_B$$

where Y is intensity of one of the color-component specific elements; CCD1 is a color image data value from a predetermined photo sensor element; C_r and C_b are the chroma values; R1, G1 and B1 are a portion of the first matrix; C_R, C_B and C_G are predetermined constants.

24. (original) The system for improving resolution in color image data according to claim 12 further comprising a parameter storage for storing multiple sets of parameters and a control unit connected to said parameter storage and said intensity estimator for selecting one of the sets of the parameters based upon a particular location in the spatial pattern.

25. (currently amended) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps of reproducing a high-resolution image, said method steps comprising:

k) placing over a unit area a predetermined spatial pattern of color-component specific filter elements on a single plane in a sensor, each of the color-component specific filter elements filtering a predetermined color-component over one of sub- unit areas in the unit area, each of the color-component specific filter elements corresponding to a single pixel;

l) sampling color image data for the unit area using the color-component specific filter elements, a portion of the color image data being sampled only through a corresponding one of the color-component specific filter elements for a corresponding one of the sub-unit areas;

m) generating chroma values for each of the color-component specific elements from the color image data;

n) simultaneously adjusting the chroma values with said step m) according to the specific spatial pattern of the color-component specific elements based upon coefficients that spatially correspond to a specific set of the color-component specific filter elements;

o) ~~simultaneously~~ adjusting the chroma values for smoothing the chroma values in said step n);

p) simultaneously estimating an intensity value for each of the pixels based upon the chroma values twice adjusted in said steps n) and o) and the color image data from said step l);

q) adjusting the intensity value for each of the pixels for an improved edge characteristic after said step p); and

r) generating RGB data based upon the chroma values adjusted in said step n) and the intensity value adjusted in said step q).

26. (previously presented) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps of reproducing a high-resolution image, said method steps comprising:

j) generating color image data from at a sensor having a specific unit spatial pattern of color-component specific photo elements, each of the color-component specific photo elements corresponding to a single pixel;

k) generating chroma values for each of the color-component specific elements from the color image data;

l) simultaneously adjusting the chroma values with said step k) according to the specific unit spatial pattern of the color-component specific elements based upon coefficients that spatially correspond to a specific set of the color-component specific photo elements;

m) further adjusting the chroma values for smoothing the chroma values adjusted in said step l);

n) estimating an intensity value based upon the chroma values twice adjusted in said steps l) and m) and the color image data from said step j);

o) adjusting the intensity value for an improved edge characteristic after said step n); and

p) generating RGB data based upon the chroma values adjusted in said step m) and the intensity value adjusted in said step o).

27. (previously presented) A method of improving color image data, comprising the steps of:

a) placing over each of unit areas a predetermined spatial pattern of color-component specific filter elements in a sensor, each of the color-component specific filter elements filtering a single predetermined color-component over one of sub-unit areas in the unit area, each sub-unit area corresponding to a single pixel;

b) sampling color image data for the unit areas using the sensor;

c) generating chroma values for each of the color-component specific elements from the color image data;

d) simultaneously adjusting the chroma values with said step c) according to the specific spatial pattern of the color-component specific elements based upon coefficients that spatially correspond to a specific set of the color-component specific filter elements; and

e) estimating an intensity value based upon the chroma values adjusted in said step d) and the color image data from said step b) for each of the pixel.

28. (previously presented) The method of improving color image data according to claim 27 further comprising the additional steps of:

f) further adjusting the chroma values for an improved color characteristic between said step d) and said step e).

g) adjusting the intensity value for an improved edge characteristic after said step e); and

h) generating RGB data based upon the chroma values adjusted in said step f) and the intensity value adjusted in said step g).

29. (previously amended) The method of improving color image data according to claim 28 further comprising an additional step i) of gamma converting the RGB data after said step h).

30. (previously presented) The method of improving color image data according to claim 27 wherein the color image data is in a RGB data format in said step a).

31. (currently amended) The method of improving color image data according to claim 30 wherein said step ~~a~~b) uses a first predetermined matrix for converting the color image data to the RGB data format.

32. (previously presented) The method of improving color image data according to claim 31 further comprising an additional step j) of gamma converting the RGB data.

33. (previously presented) The method of improving color image data according to claim 31 wherein said step d) uses a second predetermined matrix for converting the RGB data to the chroma values.

34. (currently amended) The method of improving color image data according to claim 33 wherein said first matrix and said second matrix are combined into a third matrix to be applicable in an additional step for replacing ~~said step a)~~, said step ~~b~~c) and said step ~~e~~d).

35. (previously presented) The method of improving color image data according to claim 27 wherein said step d) adjust the chroma values based upon a predetermined filter.

36. (previously presented) The method of improving color image data according to claim 33 wherein the intensity in said step e) has a range equal to all of the color-component specific photo elements in the sensor.

37. (previously presented) The method of improving color image data according to claim 36 wherein the intensity in said step e) is determined based upon following equations:

$$Y = Y_0\,CCD1 + Y_1\,C_r + Y_2\,C_b$$

$$Y_0 = -C_G / C$$

$$Y_1 = (R1\,C_G - G1\,C_R)/C$$

$$Y_2 = (B1\,C_G - G1\,C_R)/C$$

$$C = -G1 + G1\,C_R - R1\,C_G - B1\,C_G + G1\,C_B$$

where Y is intensity of one of the color-component specific elements; CCD1 is a color image data value from a predetermined photo sensor element; C_r and C_b are the chroma values; R1, G1 and B1 are a portion of the first matrix; C_R, C_B and C_G are predetermined constants.

38. (previously presented) A system for improving color image data, comprising:

a color image sensor having a predetermined spatial pattern of color-component specific photo elements for generating color image data, each of the color-component specific photo elements filtering a single predetermined color-component over one of sub-unit areas in a unit area corresponding to a single pixel, said color image sensor sampling the color image data;

an interpolated chroma value generator connected to said color image sensor for generating interpolated chroma values for each of the pixels according to the spatial pattern and for simultaneously adjusting the chroma values based upon coefficients that spatially correspond to a specific set of the color-component specific photo elements; and

an intensity estimator connected to said interpolated chroma value generator and said color image sensor for estimating an intensity value for each of the pixel based upon the interpolated chroma values and the color image data.

39. (previously presented) The system for improving color image data according to claim 38 wherein said interpolated chroma value generator further comprises a color-component specific spatial filter for interpolating the color image data and a convertor for converting the color image to the chroma values.

40. (previously presented) The system for improving color image data according to claim 38 further comprising a smoothing filter connected between said interpolated chroma value generator and said intensity estimator for reducing an error amount in the color image data.

41. (previously presented) The system for improving color image data according to claim 40 further comprising an edge enhancement filter connected to said intensity estimator for enhancing an edge.

42. (previously presented) The system for improving color image data according to claim 41 further comprising a RGB converter connected to said smoothing filter and said edge enhancement filter for generating a set of RGB data.

43. (previously presented) The system for improving color image data according to claim 38 wherein said color image sensor is one dimensional.

44. (previously presented) The system for improving color image data according to claim 38 wherein said color image sensor is two-dimensional.

45. (previously presented) The system for improving color image data according to claim 44 wherein said color image sensor is at least three by three of said color-component specific photo elements.

46. (previously presented) The system for improving color image data according to claim 40 wherein said smoothing filter is a median filter for outputting a median value.

47. (previously presented) The system for improving color image data according to claim 40 wherein said smoothing filter is a low-pass filter for outputting a median value.

48. (previously presented) The system for improving color image data according to claim 38 wherein said intensity estimator estimates the intensity value in a range equal to all of the color-component specific photo elements in said color image sensor.

49. (previously presented) The system for improving color image data according to claim 48 wherein said intensity estimator estimates the intensity value based upon following equations:

$$Y = Y_0\,CCD1 + Y_1\,C_r + Y_2\,C_b$$

$$Y_0 = -C_G / C$$

$$Y_1 = (R1\ C_G - G1\ C_R)/C$$

$$Y_2 = (B1\ C_G - G1\ C_R)/C$$

$$C = -G1 + G1\ C_R - R1\ C_G - B1\ C_G + G1\ C_B$$

where Y is intensity of one of the color-component specific elements; CCD1 is a color image data value from a predetermined photo sensor element; C_r and C_b are the chroma values; R1, G1 and B1 are a portion of the first matrix; C_R, C_B and C_G are predetermined constants.

50. (previously presented) The system for improving resolution in color image data according to claim 38 further comprising a parameter storage for storing multiple sets of parameters and a control unit connected to said parameter storage and said intensity estimator for selecting one of the sets of the parameters based upon a particular location in the spatial pattern.

51. (previously presented) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps of reproducing a high-resolution image, said method steps comprising:

k) placing over each of unit areas a predetermined spatial pattern of color-component specific filter elements in a sensor, each of the color-component specific filter elements filtering a single predetermined color-component over one of sub-unit areas in the unit area, each sub-unit area corresponding to a single pixel;

l) sampling color image data for the unit area using the color-component specific filter elements;

m) generating chroma values for each of the color-component specific elements from the color image data;

n) simultaneously adjusting the chroma values said step m) according to the predetermined spatial pattern of the color-component specific elements based upon

coefficients that spatially correspond to a specific set of the color-component specific filter elements;

o) further adjusting the chroma values for smoothing the chroma values adjusted in said step n);

p) estimating an intensity value for each of the pixels based upon the chroma values twice adjusted in said steps n) and o) and the color image data from said step l);

q) adjusting the intensity value for an improved edge characteristic after said step p); and

r) generating RGB data based upon the chroma values adjusted in said step o) and the intensity value adjusted in said step q).